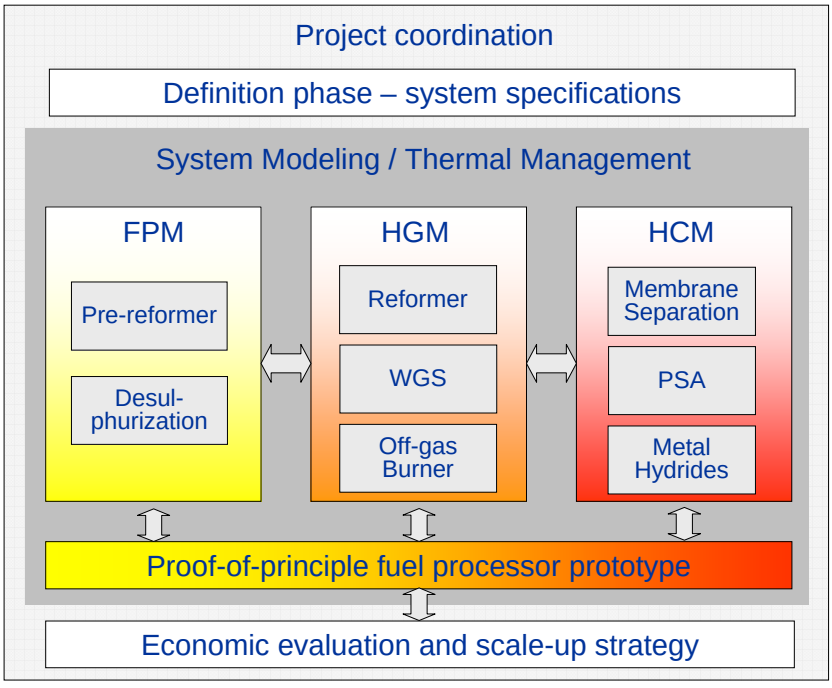
NEMESIS

New Method for Superior Integrated Hydrogen Generation System

Objective

Onsite, de-centralized hydrogen production at fueling stations from gasoline, diesel and natural gas is a first step towards a hydrogen and fuel cell based transportation. Within the European project NEMESIS a small-scale, fuel flexible hydrogen generator that is capable of working with gaseous and liquid hydrocarbon feedstock will be developed.

Three modules will be integrated into a proof-of-principle prototype:
- **Fuel Preparation Module (FPM)**: evaporation, pre-reforming and desulphurization of liquid feedstock
- **Hydrogen Generation Module (HGM)**: generic integrated steam reformer, water gas shift stage and off-gas burner
- **Hydrogen conditioning Module (HCM)**: H_2 purification with three different principles (membrane separation, temperature swing adsorption with metal hydrides, and pressure swing adsorption)



Challenges

Compared to autothermal reforming **steam reforming** of liquid hydrocarbons represents a more challenging technology in regard to reformer design and operating conditions as well as materials incorporated, but leads to higher overall efficiencies. The development of **innovative materials** like sulphur-resistant catalysts, effective adsorbents or membranes for separation bares a relatively high risk, which is lowered by the **flexibility in process concepts and operating conditions** of the modular system.

Expected Achievements

The NEMESIS prototype will meet the following targets:
- capacity to produce 10kg H_2 per day with a purity of 99.99%
- min. pressure out: 2bars
- reduction of start-up time to about 45min
- demonstration of proof-of-principle system with low sulphur diesel (<10ppm) and natural gas
- potential of an up-scaled version to be integrated into the existing infrastructure at a fuelling station

Project Facts

Total Cost: 3.9 M€
EC funding: 2.2 M€
Time span: 12/2005 – 11/2008
Instrument: STREP

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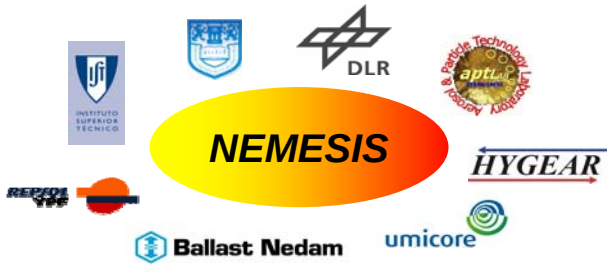
8 Partners



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